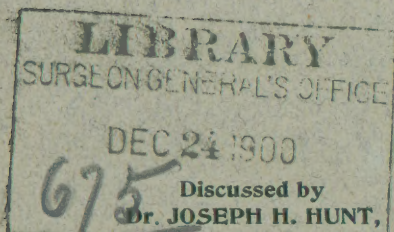


TAKAMINE (J.)

The Production of Diastase
by Microscopical Plants.
✠ Illustrated by Stereopti-
con Views.

By
JOKICHI TAKAMINE, M. D.,
Brooklyn, N. Y.

A paper read before the Thirty-fifth
regular meeting of the Brooklyn Medi-
cal Society, April 15, 1898.



President Kings County Medical Society, Brooklyn, and
Dr. ALBERT H. BRUNDAGE.

111

THE PRODUCTION OF DIAS-
TASE BY MICROSCOPICAL
PLANTS. ILLUSTRATED BY
STEREOPTICON VIEWS.

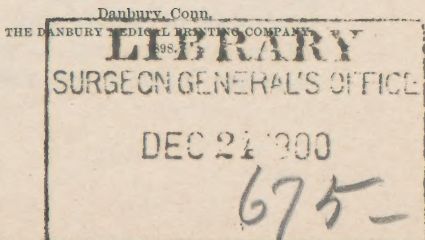
BY JOKICHI TAKAMINE, M. D.,
BROOKLYN, N. Y.

A paper read before the Thirty-fifth regular meeting
of the Brooklyn Medical Society, April 15, 1898.

DISCUSSED BY DR. JOSEPH H. HUNT,
President Kings County Medical Society, Brooklyn,
and

DR. ALBERT H. BRUNDAGE.

REPRINT FROM THE
NEW ENGLAND MEDICAL MONTHLY.
For July, 1898.



THE PRODUCTION OF DIAS-
TASE BY MICROSCOPICAL
PLANTS. ILLUSTRATED BY
STEREOPTICON VIEWS.

MR. PRESIDENT, Ladies and Gentlemen: It gives me great pleasure to address you this evening on a subject to which I have given my attention for the last twelve years, namely:—the new process of producing diastase. It is the result of the introduction of modern science into Japan. You are all aware that some forty years ago the well-known commander, Com. Perry, opened Japan for the first time to the commerce of the world. Since then Japan has made remarkable progress in the introduction of modern civilization. As a rule most of the eastern nations were opened to civilization at the point of the sword or Armstrong gun. In the case of Japan it is interesting to note that the opening of the country was by the influence of medical science.

Even before Com. Perry came over, there was a small settlement of Hollanders in the port of Nagasaki and the practice of the Dutch doctors was highly appreciated:—so much so that a college and hospital was established with a faculty and staff composed of Dutch doctors. Young men gathered from different parts of the country and studied medicine in that school, and before long its disciples were scattered all over Japan. Many schools were established where the medical sciences were taught according to the European methods. About thirty years ago, a civil war, or revolution occurred, after which the Emperor of Japan resumed his power, and to his government all this modern progress of Japan is due. When the Emperor resumed power, he selected for his cabinet, men of modern ideas, men thoroughly acquainted with the methods of present civilization. From 50 to 60 per cent. of the cabinet members were interested in medicine, either he was a physician, was going to be a physician, or had studied modern science under medical men. So you will observe that the medical

science opened the heart of the Japanese people, and not the point of the gun, as was the case in many other countries. As a step of progress, colleges and universities were established under the able professorship of Americans and Europeans. Young people were selected and sent abroad to gain a knowledge of modern sciences. Various applications of their studies have been made in Japan. The subject to which I desire to draw your attention this evening is one of the results of such an application of modern science, which has been known in Japan for centuries, namely:—the Japanese method of producing diastasic substances.

Up to the present time the germination of cereals has been the only source of diastase of any practical importance known in America and Europe. There are diastases of animal origin, such as precipitated ptyaline, or pancreatic diastase. But their sources are limited and their potency unreliable. At any rate, the mass of artificial diastase was supplied by a diastase of vegetable origin and was made in the manufacture of alcoholic beverages. It seems that every na-

tion drinks more or less alcohol, even some of the primitive savage tribes; they seem to want the effect of a stimulant. It is said that some savage tribes use the diastase of the saliva as the source of alcoholic drinks. They manage to cook starchy grains and then each contributes the diastase of his own manufacture, in the form of saliva, into the common pot. In a little while the starch will be converted into sugar. In the course of a few days fermentation sets in and the alcoholic beverage is ready, which the contributor comes back to enjoy.

As civilization advances it is found that individuals cannot utilize the diastase of saliva for the manufacture of alcoholic beverages. On the contrary, an artificial diastase becomes necessary. In America and Europe, as previously stated, the germination of cereals was the only source of vegetable diastase, but in Japan, as in some other Asiatic countries, certain kinds of fungi were used in the production of diastase which is one of the essential elements required in the manufacture of alcoholic beverages. I have taken up

this subject for investigation, and have found various kinds of fungi that have the property of generating diastase besides that which is used in Japan called *Eurotium Oryzæ*, by Dr. Ahlburg, who first investigated the substance. Different fungi have different powers of generating diastase; some are highly diastasic, while others are non-diastasic. By careful selection and cultivation, we get a species of the best quality. After such selection is made, it is cultivated on suitable nutritious culture media and a large supply of healthy seed spores are obtained. It takes about a week to get a crop of seeds.

To make a practical use of this microscopical plant the bran of wheat is selected as the most convenient culture media. The bran is first moistened with water and thoroughly sterilized by steaming. After the mass has cooled, it is thoroughly mixed with a small quantity of spores of pure culture. The mass is then put into an incubator, or growing room, similar to that of a malt floor, and is kept at the proper temperature and humidity. In about twenty-four hours the fungus shows

its growth and the diastasic strength of the mass steadily increases. In about fifty hours there is a dense growth of a velvety appearance. At this stage the mass is taken out of the growing room and allowed to cool to ordinary temperature. It is now put into a percolator and cold water passed through it. The diastase generated in the mass is dissolved in water and comes out in the extract. This extract is used in the place of malt in distilleries, breweries, or vinegar factories. The extract, when desired for preservation or transportation, is evaporated in a vacuum pan to a syrupy consistency. In this condition its diastasic power is about ten times stronger than a malt extract of similar consistency, and can be used in many industries in place of malt. This aqueous extract can be still further purified by precipitating the diastasic principle of the extract by the addition of alcohol. For this purpose, the extract, containing 10 to 20 per cent. of solid matter, is mixed with four or five times its own volume of strong alcohol. By this means the diastase, with some other albuminoids, is pre-

cipitated, while the sugars and other impurities remain in solution. The precipitate is now separated from the mother liquor by decantation and centrifugal force. It is then pressed and dried. The product thus obtained is a yellowish-white, odorless powder, possessing a nutty taste. It has a remarkably strong diastasic power. It will digest three hundred times its own weight of dried starch in thirty minutes according to the modified Junk's test, or it will digest two to three thousand times its own weight of cooked starchy food, such as bread, potato, pudding, etc., inside of thirty minutes. It can still be further purified by precipitation or otherwise, but it is strong enough for all practical purposes. The product thus obtained I take the privilege of calling "Taka-Diastase," in order to distinguish it from other diastases. "Taka" signifies "strong" in the Greek language, and "high" in the Japanese, and is also the first half of my name.

The diastasic power of Taka-Diastase is remarkably stable, and this property can be utilized as a standard of comparison between other preparations in the determination of

the diastasic power of other substances.

Its use as a remedy for amylaceous dyspepsia is of no mean importance. Considering the fact that more than two-thirds of our food consists of starchy substances such as potato, bread, pudding, etc., and also that the diastase of the saliva has to perform the principal function in the digestion of starchy food, and that the saliva is subjected to loss and deterioration of its diastasic power from various causes, such as smoking, drinking, chewing, and rapid eating, it is not to be wondered at that two-thirds of the dyspepsia is of a starchy origin, and therefore, it is apparent that some kind of strong diastasic substance must supply the deficiency.

The object of my address this evening is primarily to draw your attention to the fact that the advance of Japan is due directly to the influence of medical science in that country, and, secondly, to show that this method of producing diastase and other digestive ferments from fungi growths seems to open entirely new fields for the investigation of useful ferments. I firmly believe:

that this method of producing diastase will not only supersede every known process, such as the germination of cereals, etc., but will also lead to the production of several other digestive ferments, such as those digesting albuminoids and fatty foods.

DISCUSSIONS.

DR. JOSEPH H. HUNT:—I wish to express my appreciation of the address that Dr. Takamine has delivered to us this evening. It has been a source of great pleasure, as well as instruction. For many years I have used very little pepsin, almost none. I have recently used Diastase in several cases and generally with great success. Although my cases have not always been well selected, Diastase has done well in my hands.

I, myself, am very fond of a good dinner and frequently the result is an uncomfortable distention of the abdomen, borborygmus, in fact the general symptoms of indigestion. Some time ago I commenced a course of treatment with Taka-Diastase, taking a capsule after dinner, and I was very much improved. As is usual in all cases when improvement

begins, I neglected myself and discontinued the remedy. My reward was a return of the old trouble, to be again relieved by the Taka-Diastase.

The following case is an interesting one: A patient came to me one morning from Danville, Va., with great distress, saying that he must have immediate relief. He had been treated for a year or more for indigestion, but with no benefit. He said he had not been able to eat anything for months. His distress was very intense; he was almost a lunatic. I gave him some capsules of Taka-Diastase at that time with almost immediate relief. Then I settled down to treating him scientifically. He was given a test breakfast and the stomach was washed out an hour afterward. The mixture was then subjected to a careful analysis and it was found to contain an excess of hydrochloric acid, mucus, blood cells and epithelium casts. The diagnosis of ulceration of the stomach was made. The patient was then treated with rest and Taka-Diastase. The final result was a complete and perfect cure. He returned to Danville and resumed his

former occupation as a machinist. His delight and gratitude were beyond expression.

The physiological chemist is certainly a great aid to the physician; and inventive chemists, like Dr. Takamine, are doing important work for the medical profession. We, as active practitioners, are too busy to give the proper attention to the chemistry of our profession, hence the necessity for such scientific investigators as Dr. Takamine. They spend their life in this class of work, and we, as physicians, are greatly benefited by the results of their labors.

DR. A. H. BRUNDAGE:—We must recognize that such a digestive agent as this Taka-Diastase has a certain degree of importance and value when it will do such work as it has been shown this will do.

We have been called a nation of dyspeptics, and unquestionably there is a certain amount of truth in the appellation. Those who suffer the pains, annoyances and trials of dyspepsia know how unfortunate is the condition which deserves the name, and how grateful is the relief.

The scientific man who adds his quota to the list of remedies for the affection confers a boon upon mankind, and deserves recognition and appreciation. From observation, some personal experiences, and certain information which has come to me regarding the workings of this digestive agent, I am impressed with its value, and am grateful to the author for his discovery and for the paper and demonstrations he has favored us with this evening.

